

## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

2024/DOP/Solar/Technical-Desk-1/CR-56

Date: - 11/03/2024

### Quotation Call

To,  
(Supplier/Developer/Contractor/Integrator)

**Sub: Survey, Design, Fabrication, Supply, Installation, Testing, Commissioning 1 no's of 10 HP (AC) Solar PV Water Pumping Systems with fencing under Water Supply Scheme at Nimgaon Tembhurni, Taluka Madha District Solapur, Maharashtra with Comprehensive Maintenance Contract for a period of 5 years– Invitation to Quote**

With reference to subject matter, we would like to invite your quotes in sealed condition for undertaking the said work with given technical specifications and technical standards with following terms and conditions –

• **Details and Dates:** -

1	System details	10 HP (AC) Solar PV Water Pumping Systems with fencing
2	Estimated Cost	Rs. 9,09,534/- (Inclusive of all taxes and charges)
3	Date and time for submission of quotations.	From 11/03/2024; 10:00 Hrs to 15/03/2024 18:00 Hrs
4	Date and time for opening of quotations.	18/03/2024; 11:00 Hrs
5	Security Deposit	Rs. 27,286/- (to be deposited by online mode in favor of Maharashtra Energy Development Agency, Pune)
6	Address for communication	Maharashtra Energy Development Agency, Divisional Office Pune, Aundh Road, Near Commissionerate of Animal Husbandry, Opposite Spicer College, Aundh, Pune-411007
7	Site location	Grampanchayat Nimgaon (Tembhurni), Tal. Madha, Dist. Solapur

➤ **ELIGIBILITY CRITERIA** –

The manufacturer/supplier shall be eligible to quote for this work provided fulfilment of following.

1. Shall have a registered firm/company with GST registration within Pune division.
2. Shall provide brief information in prescribed format (enclosed).
3. Shall not be black listed in any govt and/or other organizations.
4. Shall provide documentary proof about having experience of supply, installation and commissioning of minimum 2 Nos of Solar PV Water Pumping Systems of 7.5 HP capacity and above.
5. Preference will be given to the Bidders those have Successfully Commissioned Projects in Nodal Agency/ Govt. Organization/ Private Organization etc.

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6. Shall have an Average annual turnover of minimum 20 Lakh in each financial year during last three years duly certified by chartered accountant.
7. Shall provide self-attested copy of IT returns of last three years.
8. Is a manufacturer of Motor pump set/ Solar PV Water Pumping Systems controller/ SPV system or System Integrator and shall provide the test certificate of SPV system issued by MNRE or its authorized test centers.
9. Shall have arrangement of providing after sales service in area of installation of systems.

### ➤ **TERMS AND CONDITIONS** –

- 1) Location for installation of Solar PV Water Pumping Systems shall be assigned immediately by the user agency to the selected manufacturer/ supplier to get the work done in stipulated time.
- 2) The installation of Solar PV Water Pumping Systems should be done in excellent manner and meet technical standards prescribed by the MEDA.
- 3) As per the technical criteria set by the Ministry of New and Renewable Energy, Govt. of India the solar modules should fulfill the IEC standards and shall be procured from manufacturer providing module with RFID tag.
- 4) The manufacturer/ supplier shall provide valid test certificate of Solar PV Water Pumping Systems and other equipment's/ component from govt. approved test centers.
- 5) The manufacturer/ supplier shall provide Solar Modules from the approved Manufacturers which are enlist in MNRE's ALMM list.
- 6) The manufacturer/ supplier shall provide module approved by MNRE else have to submit valid test certificate of Motor pump set/ Solar PV Water Pumping Systems controller/ module and other equipment's/ component from govt. approved test centers.
- 7) The Solar module should be engraved with name of company supplying the same along with installation date etc.
- 8) If the Solar PV Water Pumping Systems doesn't function as per given standards then the loss incurred shall be borne by the supplier and paid to Grampanchayat Nimgaon (Tembhurni), Tal. Madha, Dist. Solapur.
- 9) If contractor fails to complete the work then Security Deposit will be forfeited and contractor shall be blacklisted.
- 10) Supplier shall give training of system operation to a person duly nominated by user agency and same shall be informed to Divisional office MEDA Pune.
- 11) The Contractor/ Agency should successfully complete the project within time frame set out by the MEDA.
- 12) The manufacturer/ supplier shall provide the user manual, warranty card to the user agency and same shall be informed to Divisional office MEDA Pune.
- 13) The manufacturer/ supplier shall visit the site and ensure scope of work before submission of quote against the enquiry. In this context, it is mandatory to the manufacturer/ supplier should submit the Site Visit Report in given prescribed format along with this quote.
- 14) The work being of limited nature and to seek prompt after sales service the manufacturer/ supplier within Pune District will be preference while allotting the work against the invited quotes.
- 15) The Contractor shall provide the detailed information about Company/ firm in attached Format (Contractor's Information sheet)

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- 16) *The manufacturer/ supplier shall submit their quotations in two different sealed envelopes i.e. First envelop shall contains documents as per the technical eligibility criteria and Second envelop shall contain Financial details (quoted rate).*
- 17) *The manufacturer/ supplier should mention the subject on each sealed envelope i.e. Technical Envelop and Financial Envelop.*
- 18) *The financial envelop of technically qualified bidders will only be opened.*

### ➤ **COMPREHENSIVE MAINTENANCE CONTRACT (CMC)**

- i. The complete Solar PV Water Pumping Systems must be warrantee against any manufacturing/ design/ installation defects for a minimum period of 5 years.
- ii. During the CMC period, timely cleaning of SPV panels (once in fortnight) of system shall bound to Beneficiary.
- iii. During the CMC period, successful supplier should visit the site quarterly (after each 03 months) and ensure the successful working of Solar PV Water Pumping Systems. Also supplier shall maintain the visit log book at the site. If any problem occurs in working of Solar PV Water Pumping Systems; supplier shall attend the system within 48 hours and rectify the problem immediately.
- iv. In case if supplier fail to provide service during the CMC period, the Performance Bank Guarantee should be forfeited and Contractor/ Supplier shall be blacklisted.

### ➤ **INSURANCE:**

1. The manufacturer/ supplier shall provide complete insurance of Solar PV Water Pumping Systems coverage ex-factory until commissioning of project and acceptance for replacement or repair of any part of the consignment due to Natural calamity, theft, damage, fire, burglary.
2. It is the responsibility of successful manufacturer/ supplier to draw the complete insurance of Solar PV Water Pumping Systems in the name of MEDA Pune on behalf of user agency (name of the user agency to be mentioned in insurance policy) from the date of commissioning up to 05 Years period covering the natural calamity, theft, burglary, fire and damage of project.
3. The Successful manufacturer/ supplier should pay the necessary insurance premium for the said project.
4. The Bidder shall be responsible and take an Insurance Policy for transit-cum-storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning. The bidder shall also take appropriate insurance during O&M period, if required.
5. The Bidder shall also take insurance for Third Party Liability covering loss of human life including students (User), engineers and workmen and also covering the risks of damage to the third party/ material/ equipment/ properties during execution of the Contract.
6. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of bidder.
7. Any complaint registered due to Natural calamity, theft, damage, fire, burglary by user agency shall be attended by the manufacturer/ supplier and claims be settled with insurance company accordingly.
8. In case of any loss encountered by the project due to natural calamities, theft, burglary, fire and damage etc. the manufacturer/ supplier shall be responsible for filing the insurance claim with the respective insurance company and ensure to get compensation for loss in the project equipment.

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### ➤ **TERMS OF PAYMENT:**

- A. 80% of the total cost will be released after successful installation and commissioning of the Solar PV Water Pumping Systems duly certified by Contractor, Officer of MEDA & authorized person of User Agency along with submission of undertaking of comprehensive contract (CMC) for 5 years from date of commissioning and complete Insurance policy documents of SPV Solar System (covering Natural calamity, damage, fire, burglary) effective from date of installation up to five-year period from date of commissioning.
- B. 20% of the total cost shall be released on receipt of three-month successful performance report generated automatically through Remote Monitoring System (RMS) as well as manually which should be duly certified by Officer of MEDA, authorized person of User Agency and submission of performance bank guarantee of 10% amount of project cost from any Nationalized Bank valid for period of 5 years from date of commissioning of project.
- C. In case if “Bidder” does not provide service during the warrantee period, PBG will be forfeited and “Bidder” will be blacklisted (in case of “Consortium”: all the partners be blacklisted)
- D. MEDA official at his discretion may ask developer to submit documents other than above mentioned; failing which General Manager, Division office, Pune shall have right to hold the payment of the project.

### ➤ **DEDUCTION:-**

- i. The TDS at the source will be deducted as per the Govt. rule and regulations.
- ii. MEDA will issue necessary certificates of TDS deduction.
- iii. C / ‘D’ form will not be issued by MEDA.

### ➤ **SECURITY DEPOSIT –**

1. The Bidder shall furnish security deposit at 3% of the total contract value within 10 days from the date of issue of work order (including Sunday and public holiday) by Online mode in favor of Maharashtra Energy Development Agency, Pune.
2. If the contractor fails to execute the work in given time or terminates the order prematurely then the security deposit will be forfeited and no excuses will be entertained.
3. The security deposit will be returned to the contractor without interest after successful commissioning of system and receipt of commissioning report duly signed by user agency, MEDA official and representative of the contractor.

### ➤ **PENALTY –**

- A penalty of 1/2% of the total project cost shall be imposed on the contractor against a delay of one week in project completion subject to a maximum of up to 10% of the total project cost. In case the penalty exceeds 10% of the total project cost, the given order will be canceled & the security deposit will be forfeited and the Contractor/ Supplier shall be blacklisted.

### ➤ **TIME FRAME:**

- a) The successful Bidder will be required to complete the project installation work within the 60 Days from the date of issue of work order.

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b) If project not installed or commissioned within the given time then contractor shall seek the time extension from MEDA by mentioning the valid reasons thereof.

### ➤ **CHECK LIST OF DOCUMENTS TO BE FURNISHED WITH BELOW QUOTATION**

- PAN and GST Details.
- Copy of IT Returns.
- Declaration on company letter head.
- Contractors Information Sheet.
- Annual Turnover Certificate.
- Work Experience Details.
- Site Visit Report.

We look ahead to seek your sealed quotation on or before 15/03/2024 till 18 Hrs.

Thanking you,

SD/-  
Divisional General Manager  
MEDA, Divisional Office, Pune

Encl: -

1. Contractor Information Sheet.
2. Declaration Format.
3. Annual Turn Over certificate format.
4. Site Survey Form.
5. Technical Specifications of Solar PV Water Pumping Systems.

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### CONTRACTOR'S INFORMATION

Sr. No	Particulars	
1	Name of Firm	
2	Details of Mailing Address	
3	Firm Status (PSU/ Incorporate/ Ltd/ Pvt. Ltd/ LLP/ Partnership/ Proprietary)	
4	Name & Designation of Contact Person	
5	Contact No.	
6	E-mail Address for correspondence	
7	Firm website Address	
8	Firm registration No/ ROC Establish Year of firm	
9	PAN No.	
10	GST No.	
11	Turnover (in Rs.) for FY 2020-21, 2021-22 and 2022-23	
12	Skilled manpower	
13	*Experience in Solar PV Water Pumping Systems.	

Authorized Sign and Stamp

\* Enclose documentary evidence accordingly.

# MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

## DECLARATION

(On company's letter head)

To,

**Divisional General Manager,**

Divisional Office Pune,

Maharashtra Energy Development Agency

(A Government of Maharashtra Institution)

Address: Aundh Road, Near Commissionerate of Animal Husbandry,

Opposite Spicer College, Aundh, Pune-411007

Respected Sir/Madam,

1. We have carefully read and understood all the terms and conditions of the quotation and hereby convey our acceptance to the same.
2. The information / documents furnished along with our offer are true and authentic to the best of my knowledge and belief, we are well aware of the fact that furnishing of any false information/ fabricated document would lead to rejection of our quotation at any stage besides liabilities towards prosecution under appropriate law.
3. We have apprised our self fully about the job to be done during the currency of the period of agreement and also acknowledge bearing consequences to of non-performance or deficiencies in the services on our part.
4. We have no objection, if enquiries are made about the work listed by us.
5. We have not been barred or blacklisted by any Government Agency / Department/ PSU or any such competent Government authority, organization where we have worked. Further, if any of the partners/ directors of the organization/ firm is blacklisted or having any criminal case against them, our quote shall not be considered. At any later point of time, if this information is found to be false, Divisional General Manager, Divisional Office Pune, Maharashtra Energy Development Agency, may terminate the assigned contract immediately.
6. We have not been found guilty by a court of law in India for fraud, dishonesty or moral turpitude.
7. We agree that the decision of Divisional General Manager, Divisional Office Pune, MEDA in selection of quotation and shall final and binding to us.

For

(Company Name)

Name of signing authority / Designation / Place / Date

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### Annual Turnover

Each Contractor must fill in this form including private /public limited company.

- **Annual Turnover Data for the FY 2020-21, 2021-22 and 2022-23**
- **Name of Company:**

<b>Year</b>	<b>Rs in Lacs</b>
2020-21	
2021-22	
2022-23	

The information supplied should be the Annual Turnover of the Contractor in terms of the amounts billed to clients for each year for work in progress or completed.

Signature of Applicant

Certified by Applicant's Auditor

(Affix Stamp)



**MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE**

**SITE VISIT REPORT**

(To be submitted on letterhead of contractor)

Date: \_\_\_\_\_

To,

**The Divisional General Manager,**

Divisional Office Pune,

Maharashtra Energy Development Agency (A  
Government of Maharashtra Institution)

Address: Aundh Road, Near Commissionerate of Animal Husbandry,  
Opposite Spicer College, Aundh, Pune-411007

**Sub.:** Site Visit Report for Installation and Commissioning of 1 no's of 10 HP (AC) Solar PV Water Pumping Systems with fencing under Water Supply Scheme at Nimgaon Tembhorni, Taluka Madha, Dist- Solapur, Maharashtra.

Ref.: Quotation Call ..... Date:

Sir,

This has reference to above referred quotation call for Installation and Commissioning of 1 no's of 10 HP (AC) Solar PV Water Pumping Systems with fencing under Water Supply Scheme at Nimgaon Tembhorni, Taluka Madha, Dist- Solapur, in state of Maharashtra.

I/ We hereby declare that we have visited the site.

I/ We have made my ourselves acquainted with site conditions, approach to site, requirement of area, availability of water, requirement of quotation conditions etc.

I/ We have verified all details required to execute the project.

I/ We have no problems in undertaking the project and complete them in the given time period.

Thanking you

Yours faithfully,

(Signature of Contractor)

Name of Contractor -----

Designation -----

Seal -----

**Signature of User Agency authorities.**

**Seal:** .....

# MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

## TECHNICAL SPECIFICATIONS, PERFORMANCE TESTING AND OTHER OPERATION AND MAINTENANCE GUIDELINES

### **1. Scope**

This specification covers design qualifications and performance specifications for Centrifugal Solar Photo Voltaic (SPV) Water Pumping Systems to be installed on a suitable bore-well, open well, water reservoir, water stream, etc., and specifies the minimum standards to be followed under New Scheme for Farmers launched by Government of India on 8.3.2019.

### **2. Terminology**

In addition to the terminology specified in 3 of IS 5120 and IEC 62253, the following shall also apply.

**2.1 Static Water Depth**—It is the depth of water level below the ground level when the pump is not in operation.

**2.2 Draw-Down**—It is the elevation difference between the depth of static water level and the consistent standing water level in tube well during operation of pump set.

**2.3 Submergence** — It is the minimum height of water level after drawdown above the pump suction casing.

**2.4 Manometric Suction Lift** — Manometric suction lift is the vacuum gauge/suction manometer reading in meter of water column when pump operates at suction lift.

**2.5 Static Suction Lift**—Static suction lift/head is the vertical distance between sump water level and center of pump inlet.

**2.6 Daily Water Output** — It is the total water output on a clear sunny day with three times tracking SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 KWh / m<sup>2</sup> on the surface of SPV array (i.e. coplanar with the SPV Modules).

**2.7 Wire to Water Efficiency-** It is the combined system efficiency of SPV Converter/ Controller with inbuilt MPPT mechanism, Pump set and piping.

**2.8 SPV Controller** - Pump Controller converts the DC voltage of the SPV array into a suitable DC or AC, single or multi-phase power and may also include equipment for MPPT, remote monitoring, and protection devices.

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**2.9 Maximum Power Point Tracker (MPPT)** —MPPT is an algorithm that is included in the pump controller used for extracting maximum available power from SPV array under a given condition. The voltage at which SPV array can produce maximum power is called 'maximum power point 'voltage (or peak power voltage).

### 3. Constructional features

#### 3.1 General

**3.1.1 SPV Water Pumping System** set uses their radiance available through SPV array. The SPV array produces DC power, which can be utilized to drive a DC or an AC pump set using pump controller.

**3.2** A SPV Water Pumping system typically consists of:

##### *3.2.1 Pump Set*

Pump set may be of anyone of the following types:

- i) Mono-set pump;
- ii) Open well submersible pump;
- iii) Submersible pump;

##### **3.2.2 Motor**

The motor of the pump set may be of the following types:

- i) AC Induction Motor.
- ii) DC Motor [PMSM/BLDC/SRM (with brush or brushless)].

##### *3.2.3 SPV Controller See 2.8*

Note: Some controllers are in built in the motors

**3.2.4** Provision for remote monitoring for the pumps must be made in the pump controller through an integral arrangement having following basic functions:

- a) Controller must be assigned with a unique serial number and its live status must be observed remotely on online portal through login credentials.
- b) Live status must indicate whether controller is ON/OFF
- c) The parameter i.e. the water output, water flow rate, In fault condition, array input voltage/current, power and motor frequency should at logged at an interval of 10 minutes
- d) Controller must have a back up to store the data locally (at least for 1year).

### **3.3 Solar Photo Voltaic (SPV) Array**

**3.3.1 SPV** arrays contains specified number of same capacities, type and specification modules connected in series or parallel to obtain the required voltage or current output. The

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SPV water pumping system should be operated with a PV array minimum capacity of **9000 Watts peaks**, measured under Standard Test Conditions (STC). Sufficient number of modules in series and parallel could be used to obtain the required voltage or current output. The power output of individual PV modules used in the PV array, under STC, should be a minimum of 300 Watts peak, with adequate provision for measurement tolerances. Use of PV modules with higher power output is preferred.

**3.3.2** Modules supplied with the SPV water pumping systems shall have certificate as per IS14286/IEC 61215 specifications or equivalent National or International/ Standards. STC performance data supplied with the modules shall not be more than one year old.

**3.3.3** Modules must qualify to IS/IEC 61730 Part I and II for safety qualification testing.

**3.3.4** The minimum module efficiency should be minimum 15 percent and fill factor shall be more than 70 percent.

**3.3.5** Modules must qualify to IEC TS 62804-1:2015 for the detection of potential-induced Degradation -Part 1: Crystal line silicon (Mandatory in case the SPV array voltage is more than 600VDC)

**3.3.6** In case the SPV water pumping systems are intended for use in coastal areas the solar modules must qualify to IEC TS 61701:2011 for salt mist corrosion test.

**3.3.7** Then name plate shall conform the IS 14286/IEC61215

**3.3.8** Module to Module wattage mismatch in the SPV array mismatch shall be within  $\pm 3$  percent.

**3.3.9** Variation in overall SPV array wattage from the specified wattages shall be within zero percent to +10 percent.

**3.3.10** The PV Modules must be warranted for output wattage, which should not be less than 90% of the rated wattage at the end of 10 years and 80% of the rated wattage at the end of 25 years.

### **3.4 Motor-Pump Set**

**3.4.1** The SPV water pumping systems may use any of the following types of motor pump sets:

- a) Surface mounted motor-pump set
- b) Submersible motor-pump set
- c) Floating motor-pump set
- d) Any other type of motor pump set after approval from Ministry.

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**3.4.2** The “Motor-Pump Set” should have a capacity in the range of 10 HP and should have the following features:

- a) The mono block AC centrifugal motor pump set with the impeller mounted directly on the motor shaft and with appropriate mechanical seals which ensures zero leakage.
- b) The motor of the capacity ranging 10 HP X 2 No’s should be AC. The suction and delivery head will depend on the site-specific condition of the field.
- c) Submersible pumps could also be used according to the dynamic head of the site at which the pump is to be used.

**3.4.3** The pump and all external parts of motor used in submersible pump which are in contact with water, should be of stainless steel of grade 304 or higher as required. The motor-pump set should have a 5 years warranty and therefore, it is essential that the construction of the motor and pump should be made using parts which have a much higher durability and do not need replacement or corrode for at least 5 years of operation after installation.

**3.4.5** The suction/ delivery pipe shall be of HDPE or PVC column pipes of appropriate size, electric cables, floating assembly, civil work and other fittings required to install the Motor Pump set. In case of HDPE pipes the minimum pressure rating of 10 kg/sqcm-PE100 grade for 10 HP pumps and further higher minimum pressure rating for above 10 HP as appropriate shall be used.

### **3.5 Module Mounting Structures and Tracking System**

**3.5.1** The PV modules should be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour. The raw material used and process for manufacturing of module mounting structure including welding of joints should conform to applicable IS. The module mounting structure should be hot dip galvanized according to IS 4759. Zinc content in working area of the hot dip galvanizing bath should not be less than 99.5 % by mass.

**3.5.2** To enhance the performance of SPV water pumping systems arrangement for season a tilt angle adjustment and three times manual tracking in a day should be provided. In order to make structure rigid, the gap between Telescopic pattern supports should be minimal, further, for bearing of center load of whole structure only pins should be used instead of threaded bolts.

**3.5.3** The general hard ware for structure fitment should be either SS 304 or 8.8 grades. Modules should be locked with anti-theft bolts of SS 304 Grade. Foundation should be as per the site condition, based on the properties of Soil. Foundation can be done either with

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the help of 'J Bolt' (refer IS5624 for foundation hardware) or direct piling, it should be decided as per the site and relevant IS i.e. IS 6403 / 456 / 4091 / 875 should be referred for foundation design.

**3.5.4** Details of Module Mounting Structure for different capacity of SPV pumps are attached at Annexure-I. These are indicative of minimum standards and an Implementing Agency may specify higher standards.

### **3.6 SPV Controller**

**3.6.1** Maximum Power Point Tracker (MPPT) shall be included to optimally use the power available from the SPV array and maximize the water discharge.

**3.6.2** The SPV Controller must have IP(65) protection or shall be housed in a cabinet having at least IP(65) protection.

**3.6.3** Adequate protections shall be provided in the SPV Controller to protect the solar powered pump set against the following:

- a) Dry running;
- b) Open circuit;
- c) Accidental output short circuit;
- d) Under voltage;
- e) Reverse polarity;
- f) SPD to arrest high current surge; and
- g) Lightning arrestor.

**3.6.4** A good reliable DC Circuit Breaker as per IS/IEC60947-2 suitable for switching DC power ON and OFF shall be provided in the SPV Controller.

**3.6.5** All cables used shall be as per IS694. Suitable size of cable shall be used insufficient length for inter-connection between the SPV array to SPV Controller and the SPV Controller to solar powered pump set. Selection of the cable shall be as per IS14536.

**3.6.6** Controller shall be integrated with GSM/GPRS Gateway with Geo tagging. GSM/GPRS Charges to be included in the Costing till the end of Warranty period of the Pump set.

### **3.7 Earthing Arrangement**

**3.7.1** Earthing of the motor shall be done as per IS 9283 in accordance with the relevant provisions of IS 3043. Separate earthing shall be provided for Controller, pump and SPV array.

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**3.7.2** For safety purpose, it shall be surrendering installation that the earthing is capable of taking care of leakage current.

**3.7.3** In case of PVC/HDPE pipes used as discharge pipe, a separate non-corrosive, low resistance conductor from motor earth terminal to control panel earth terminal shall be provided for earthing.

**3.7.4** A lightning arrest or shall be provided with every SPV Water Pumping System.

### **3.8 Use of indigenous components**

It will be mandatory to use indigenously manufactured solar modules with indigenous mono/multi crystalline silicon solar cells. Further, the motor-pump-set, controller and balance of system should also be manufactured indigenously. The vendor has to declare the list of imported components used in the solar water pumping system.

## **4. Performance requirements**

**4.1** Under the “Average Daily Solar Radiation” condition of 7.15 KWh / sq.m. On the surface of PV array (i.e. Coplanar with the PV Modules), the minimum water output from a Solar PV Water Pumping System at different “Total Dynamic Heads” should be as specified below:

### **For A.C. Induction Motor Pump Set:**

- i) 99 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 meter (Suction head, if applicable, maximum of 7 meters) and with the shut off head being at least 12 meters.
- ii) 49 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 meter (Suction head, if applicable, up to a maximum of 7 meters) and with the shut off head being at least 25 meters.
- iii) 35 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 meter and the shut off head being at least 45 meters.
- iv) 21 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 meter and the shut off head being at least 70 meters.
- v) 14 liters of water per watt peak of PV array, from a Total Dynamic Head of 70
- vi) Meter and the shut off head being at least 100 meters.
- vii) 9 liters of water per watt peak of PV array, from a Total Dynamic Head of 100 meter and the shut off head being at least 150 meters.

The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.

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Indicative performance specifications for the Shallow and Deep well SPV Water Pumping Systems are given in this specification.

### **5. Tests for hydraulic and electrical performance of pump set**

**5.1** The motor-pump set shall be tested independently for hydraulic and electrical performance as per the relevant IS specification including following test

- a) Constructional requirements/features
- b) General requirements
- c) Design features
- d) Insulation resistance test
- e) High voltage test
- f) Leakage current test

**5.2** Testing of SPV Water Pumping Systems shall be done as per procedure specified by the MNRE.

### **6. Guarantee of performance**

**6.1** The SPV Water Pumping Systems shall be guaranteed for their performance of the nominal volume rate of flow and the nominal head at the guaranteed duty point as specified in 7.1 under the "Average Daily Solar Radiation" condition of 7.15 KWh/m<sup>2</sup> on the surface of SPV array (i.e. coplanar with the Photo Voltaic (PV) Modules). The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.

**6.2** Solar Photovoltaic Water Pumping Systems shall be guaranteed by the manufacturer against the defects in material and workmanship under normal use and service for a period of at least 60 months from the date of commissioning.

**6.3** Sufficient spares for trouble free operation during the Warrantee period should be made available as and when required

### **7. Marking and parameters to be declared by the manufacturer**

**7.1** The motor pump-set and Controller used in SPV Water Pumping Systems shall be securely marked with the following parameters declared by the manufacturer:

#### **7.1.1** Motor Pump-set

- a) Manufacturer's name, logo or trade-mark;
- b) Model, size and SI No of pump-set;
- c) Motor Rating(kW/HP);
- d) Total head, m, at the guaranteed duty point;



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- e) Capacity (LPD)at guaranteed head;
- f) Operating head range ,m;
- g) Maximum Current(A);
- j) Voltage Range(V)and;
- k) Type-A C or DC Pump set;&
- l) Photo Voltaic (PV)Array Rating in Watts peak(W<sub>p</sub>)

### 7.1.2 Controller

- a) Manufacturer's name, logo or trade-mark;
- b) Model Number;
- c) Serial Number;
- d) Voltage Range;
- e) Power Range in kW for Controller ;and
- f) Current rating (A)

## 8. **Operation and maintenance manual**

**8.1** An Operation and Maintenance Manual, in English and the local language, should be provided with the solar PV pumping system. The Manual should have information about solar energy, photovoltaic, modules, DC/AC motor pump set, tracking system, mounting structures, electronics and switches. It should also have clear instructions about mounting of PV module, DO's and DONT's and on regular maintenance and Trouble Shooting of the pumping system. Helpline number and Name and address of the Service Centre and contact number of authorized representatives to be contacted in case of failure or complaint should also be provided. A warranty card for the modules and the motor pump set should also be provided to the beneficiary.

## 9. **Comprehensive operation and maintenance**

**9.1** The Contractor should provide 5 years comprehensive maintenance of the Solar Photovoltaic Water pumping system set, which shall include corrective maintenance as well as routine service visits during guarantee period.

**9.2** AMC shall be in line with KUSUM guidelines and it's amendment (if any). The report has to be maintained. Apart from the monitoring, regular periodical maintenance of system has to be done. The report has to be maintained in a prescribed table format in a register maintained at the site which should contain Month, Inspection Date, Action taken against the Defects found in the System and Remarks of the representative of beneficiary institution along with signatures of both service Engineer and the beneficiary institution.

**9.3** The deputed personnel shall be in a position to check and test all the equipment's regularly, so that preventive actions, if any, could be taken well in advance to save any equipment from damage.

**9.4** Normal and preventive maintenance of the Solar Photovoltaic Water pumping systems such as cleaning of module surface, tightening of all electrical connections, changing of tilt angle of

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module mounting structure, cleaning & greasing of motor pump sets, changing filters etc. are also the duties of the deputed personnel during maintenance visits.

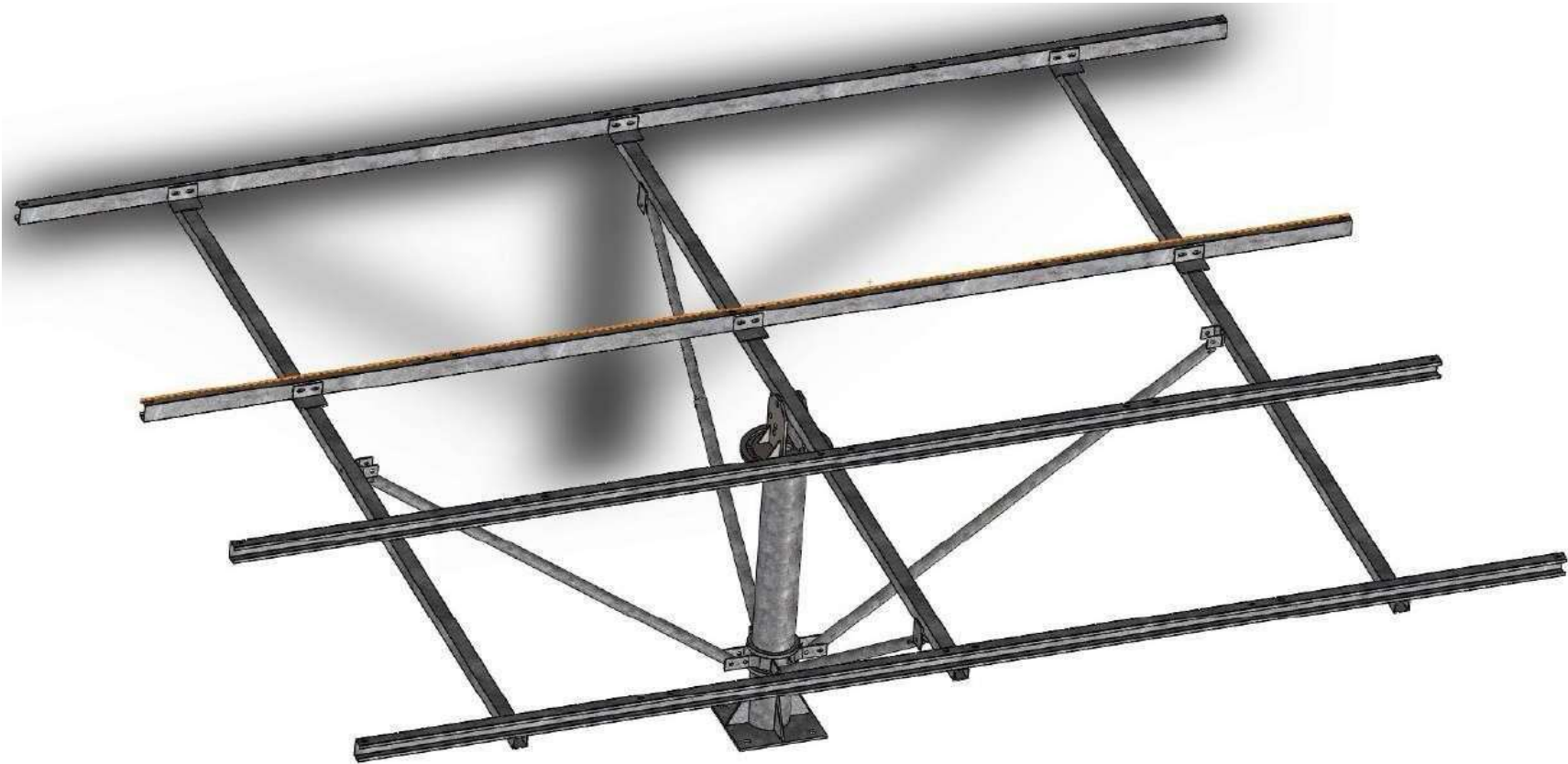
- 9.5** During operation and maintenance period of the Solar Photovoltaic Water Pumping Systems, if there is any loss or damage of any component due to mis management or mis handling or due to any other reasons pertaining to the deputed personnel by empaneled vendor, what-so-ever, the supplier shall be responsible for immediate replacement or rectification.
- 9.6** The damaged component may be repaired or replaced by new component.
- 9.7** The maintenance shall include replacement of any component irrespective of whether the defect was a manufacturing defect or due to wear and tear.

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**Annexure-II**

**Specifications for Dual Axis Manual Tracking Type**

**Module Mounting Structure (MMS) for Solar Water Pumping System**



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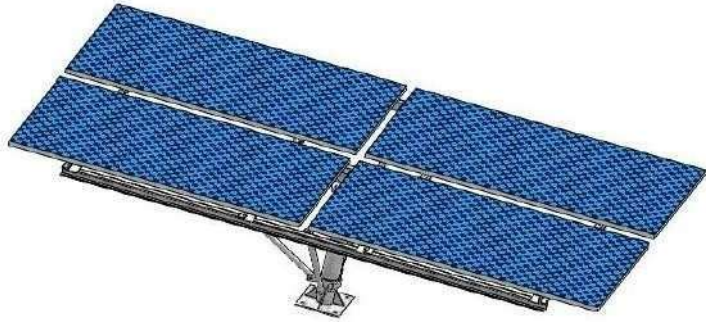
*Standard MMS for 4,6 and 8 solar modules have been specified. These standard MMS may be used in combinations for different capacities of solar water pumping systems as follows:*

1. Combination of three standard MMS of 8 Modules for 10 HP

### **Specifications of main parts used in MMS are given below:**

1. Centre Shaft: - Centre shaft used in structure should be of minimum 139 OD with minimum thickness of 4 mm with base plate minimum 10 mm thickness if used and foundation hardware should be as per IS 5624. For system without base plate i.e. direct pilling is should be as per the site condition based on the properties of Soil and refer (IS 6403 / 456 / 4091 / 875) for foundation design.
2. Rafters: -The Main and secondary after used in structure should be of either SHS &RHS pipe sections.
3. Purlin:- Mounting Purlins used in the structure should be made of Cold form steel section as per IS1079 with minimum thickness of 2mm.
4. Provision for Seasonal Tilt: -In one structure at least four telescopic supports (three may be used in MMS for 4 modules) either round hollow sections or square hollow section to be provided to support the mounting structure.
5. Provision for Daily Tracking:- Provision for Daily tracking should be provided by the way of providing min.8 mm thick metal sheet with precision cut grooves.
6. Module Locking System:- Modules should be locked with anti the ft bolts of SS 304 Grade.
7. General Hardware for Structure Fitment: - Either SS 304 or 8.8 grade hard ware should be used for fitment.
8. Hot Dip Galvanizing: -All structure parts should be hot dip galvanized according to IS4759.
9. Tolerance for fabrication :-Tolerance for fabrication of steel structure should as per IS7215.
10. Welding:- Welding Should be done as per IS:- 822& grade of welding wire should be(ER70S-6).

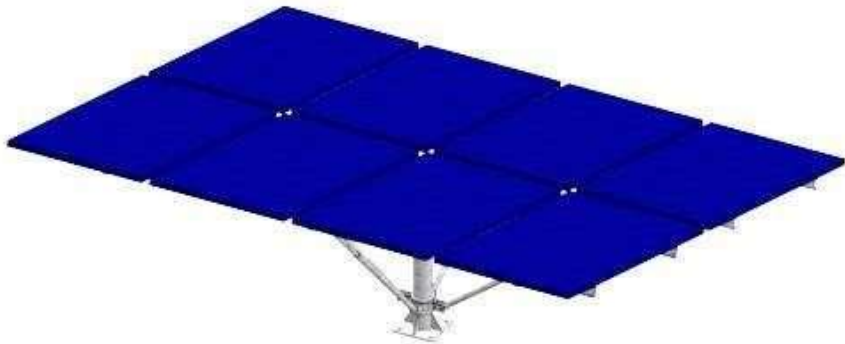
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**4 Module MMS**



**6 Module MMS**



**8 Module MMS**



**Sideview**

## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

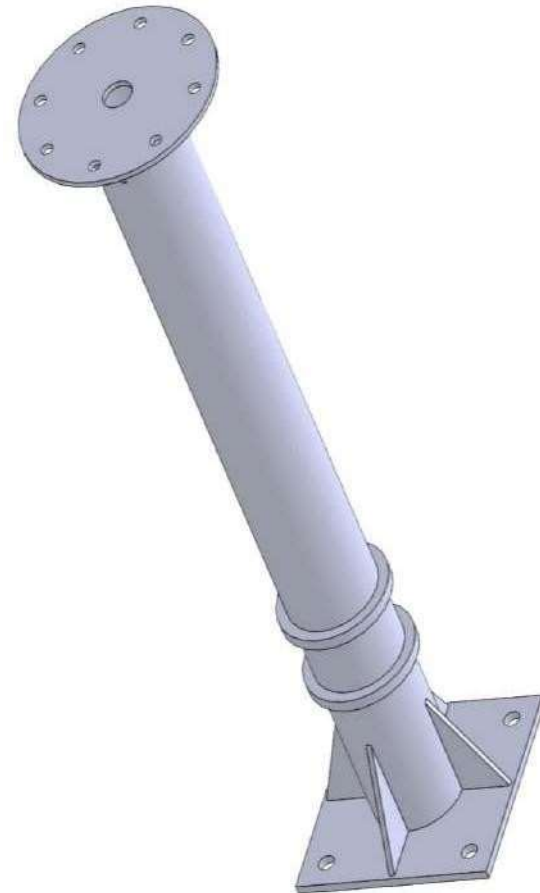
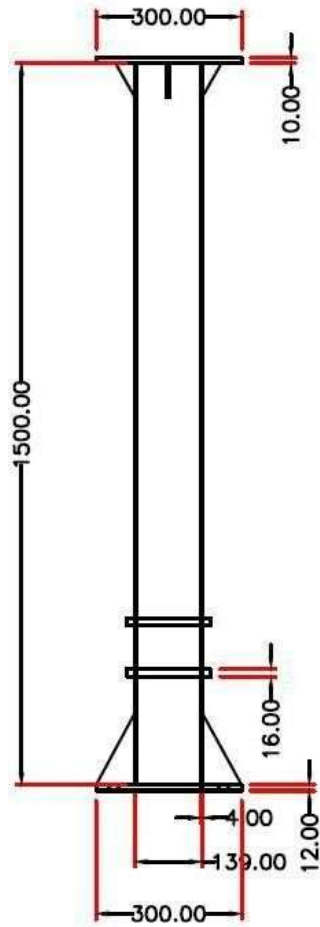
**Raw material test certificates (MTC) of all types of raw material used in dual axis manual tracking type MMS as per appropriate IS code should be submitted along with dispatch documents.**

Tests to be performed on Dual Axis Manual Tracking Type MMS for Solar Water Pumping System:-

1. For a ascertaining proper welding of structure part following should be referred.
  - a. Weld wire grade should be of grade **(ER70S-6)**
  - b. D.P. Test (Pin Hole/Crack) **(IS822)**
2. **For ascertaining hot dip galvanizing off abdicated structure following should be referred:-**
  - a. Min coating required should be as per IS4759.
  - b. Testing of galvanized material.
    - i. Peerce Test (Cu SO<sub>4</sub>Dip Test) **(IS2633)**
    - ii. Mass of Zinc **(IS6745)**
    - iii. Adhesion Test **(IS2629)**

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Part 1–Main Column



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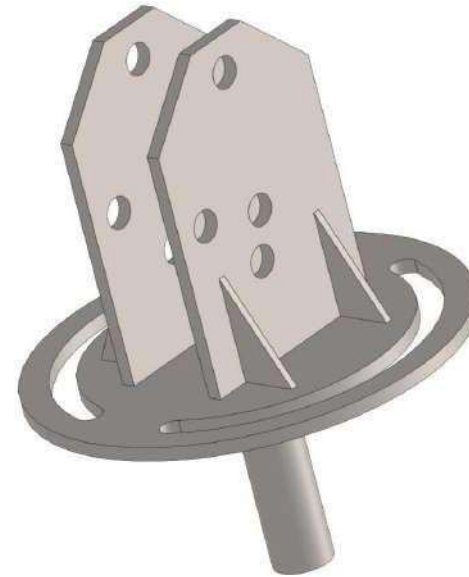
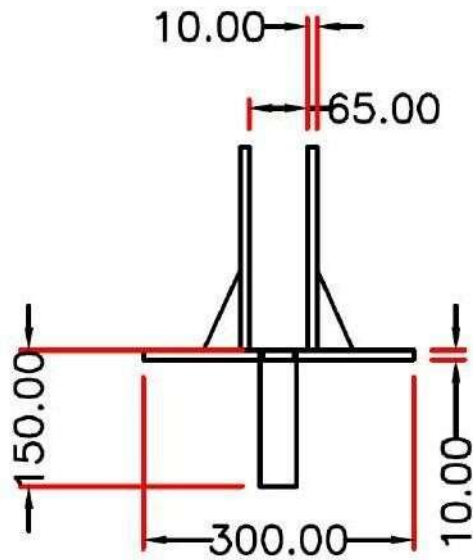
Notes: -

1. All Dimensions are in mm.
2. Main Column material grade should be YST-240 as per :- IS:1161 /1239 & E250 as per : -IS:1079 /2062.



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Part 2–Top Plate

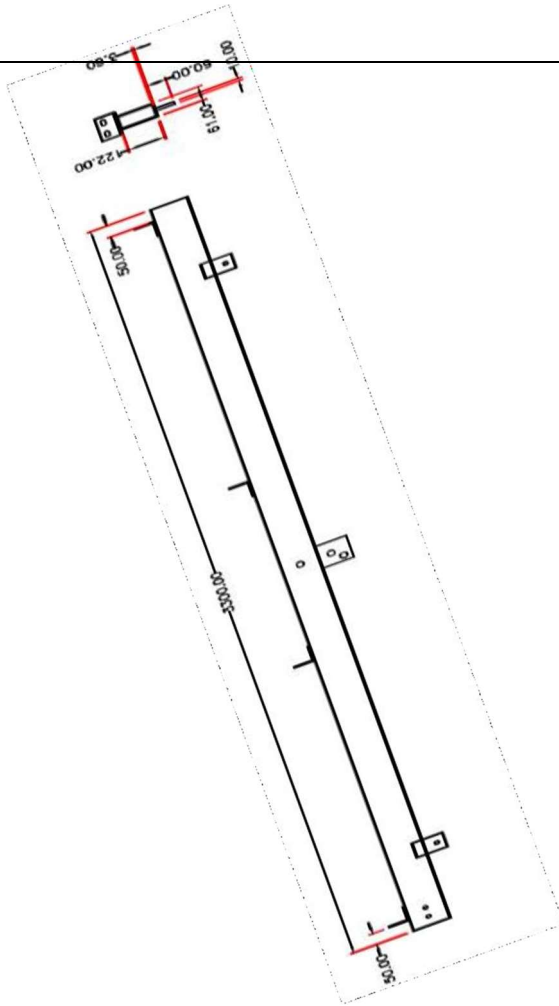


Notes: -

1. All Dimensions are in mm.
2. Top Plate material grade should be YST-240 as per: -IS:1161 /1239 & E250 as per :- IS: 1079/2062.

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### Part 3– Main Tube

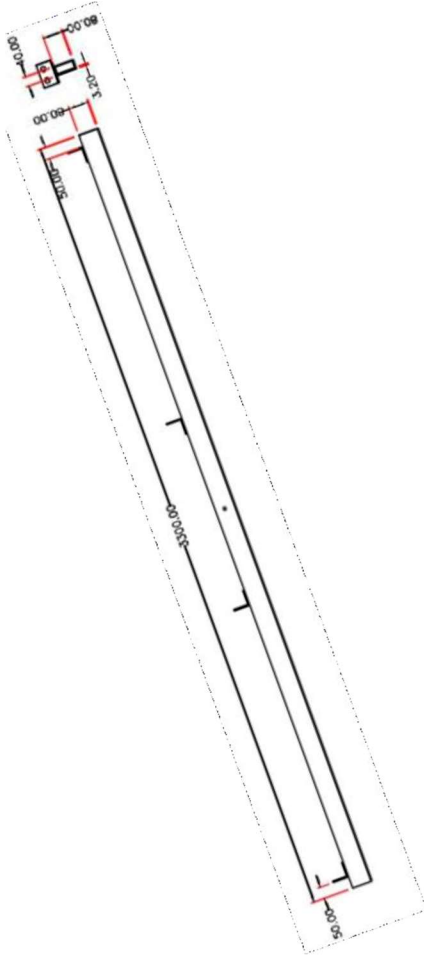


Notes: -

1. All Dimensions are in mm.
2. Main Tube material grade should be YST -240 as per :- IS: 1161/1239 & E250 as per :- IS: 1079/2062.

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### Part 4– Side Tube

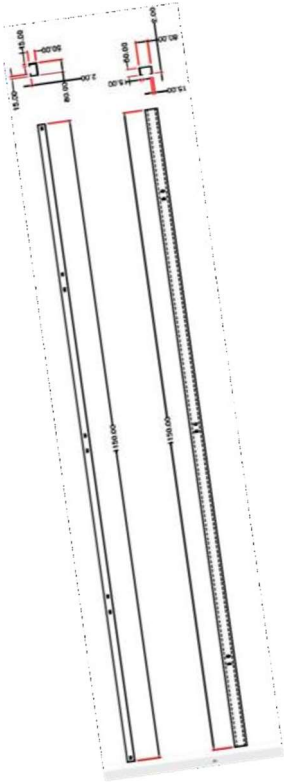


Notes: -

1. All Dimensions are in mm.
2. Side Tube material grade should be YST-240 as per: -IS:1161/ 1239 & E250 as per:- IS:1079 /2062.

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### Part 5– Purlin

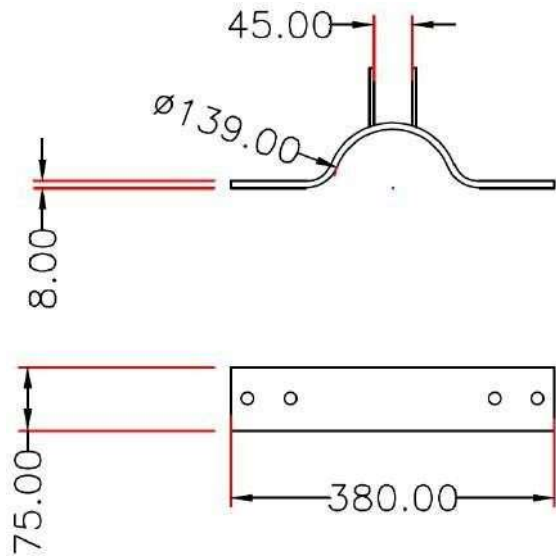


Notes: -

1. All Dimensions are in mm.
2. Mounting Purlin material grade should be E250 as per:- IS: 1079/2062 & IS:811.

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Part 6-Clamp with Blade

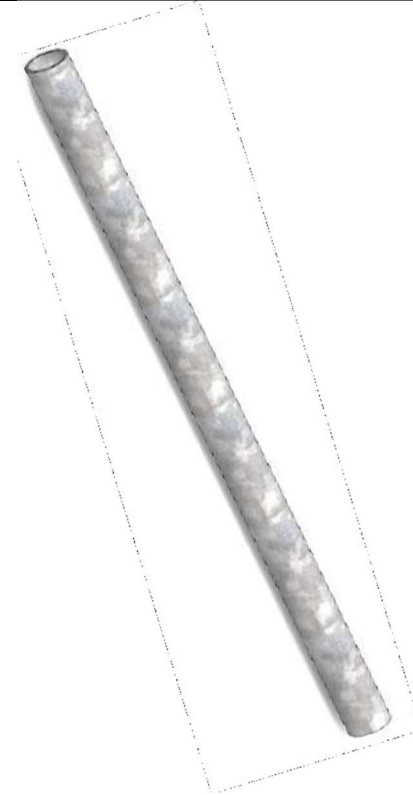
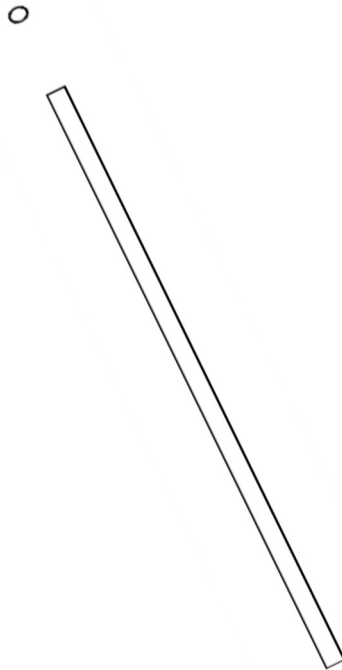


Notes: -

1. All Dimensions are in mm.
2. Clamp with Blade material grade should be as per:- IS:1079 & E250 as per: - IS:2062.

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Part 7–Supporting Pipes



Notes: -

1. All Dimensions are in mm.
2. Supporting Pipes material grade should eYST-240 as per:-IS: 1161/ 1239 & E250 as per:- IS: 1079/2062.

## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

### Bill of Quantity for main parts of MMS for Solar Water Pumping System

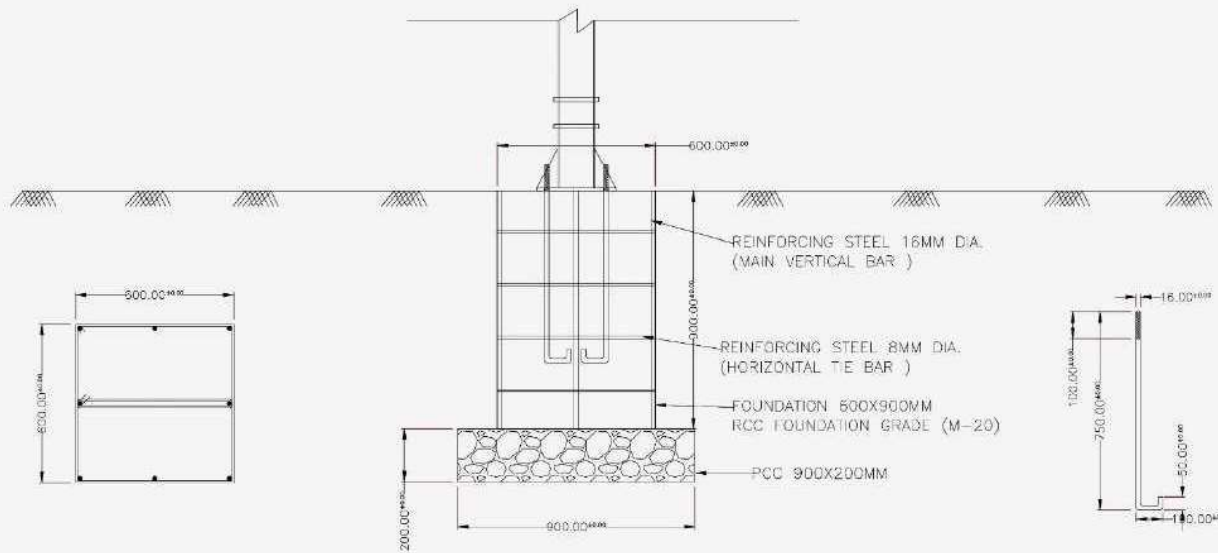
SR. NO.	PART NAME	CROSS SECTION DETAIL	LENGTH(MM)	QUANTITY PER SET
<b>A</b>	<b>Common for MMS for 4, 6 and 8 Modules</b>			
1.	MAIN POLE	139 OD	1500	1
2.	TOP PLATE	300 OD	--	1
3.	CLAMP WITH BLADE	75X8	380	2
4.	SUPPORTING PIPES	41 OD&33OD	--	6
<b>B</b>	<b>Different for MMS for 4, 6 and 8 Modules</b>			
5.	MAIN TUBE			
	4 and 6 Module	60X60X3.6	3300	1
	8 Modules	122X61X3.6	3300	1
6.	SIDE TUBE			
	4 and 6 Module	50X50X3.6	3300	2
	8 Modules	80X40X3.2	3300	2
7.	MOUNTING PURLIN			
	4 Module	80X50X15X2	2050	4
	6 Module	80X50X15X2	3100	4
	8 Modules	80X50X15X2	4150	4

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## FOUNDATION DESIGN FOR 4/6 MMS

BOM				
TMT BAR	LENGTH	WEIGHT	QUANTITY	TOTAL WEIGHT
16 MM	1000 MM	1.578 KG	8 PCS	12.6 KG
8 MM	2400 MM	0.950 KG	4 PCS	3.8 KG
8 MM	1250 MM	0.500 KG	4 PCS	2 KG

BOM				
BLOCK	WIDTH	LENGTH	HEIGHT	VOLUME
RCC COLUMN	0.600 M	0.600 M	0.900 M	0.324 CU.M
PCC	0.900 M	0.900 M	0.200 M	0.162 CU.M



Note:-All dimensions are critical & in mm. Please maintain the dimensions. Welding dimension should be maintained 5 mm.

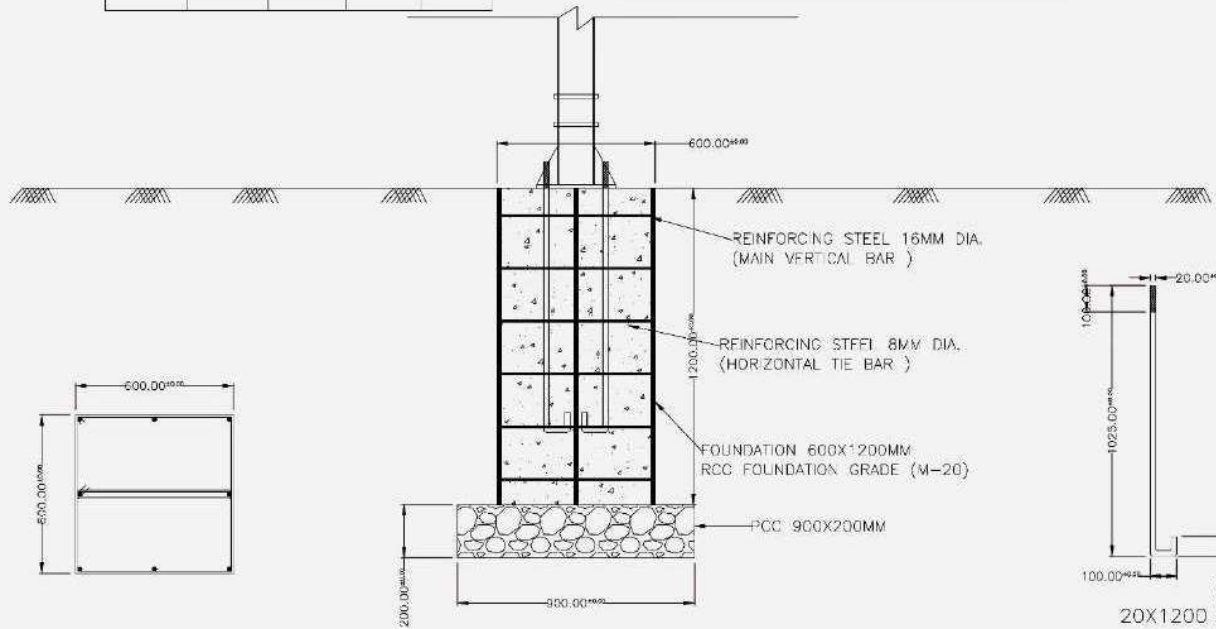


# MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

## FOUNDATION DESIGN FOR 8 MMS

BOM				
TMT BAR	LENGTH	WEIGHT	QUANTITY	TOTAL WEIGHT
16 MM	1300 MM	2.05 KG	8 PCS	16.4 KG
8 MM	2400 MM	0.950 KG	6 PCS	5.7 KG
8 MM	1250 MM	0.500 KG	6 PCS	3 KG

BOM				
BLOCK	WIDTH	LENGTH	HEIGHT	VOLUME
RCC COLUMN	0.600 M	0.600 M	1.20 M	0.432 CU.M
PCC	0.900 M	0.900 M	0.200 M	0.162 CU.M



Note:-All dimensions are critical & in mm. Please maintain the dimensions. Welding dimension should be maintained 5 mm.

## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

### Indicative Technical Specifications of Solar Deep well (submersible) Pumping Systems with A.C. Induction Motor Pump Set

Description	Model-XII	Model-XIII	Model-XIV
PV array (Wp)	9000	9000	9000
Motor Pump-set capacity (HP)	10	10	10
Shut Off Dynamic Head (meters)	70	100	150
Water output * (Liters per day)	189000 (from a total head of 50 meters)	126000 (from a total head of 70 meters)	81000 (from a total head of 100 meters)

\* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 kWh/ sq.m.on the surface of PV array (i.e. co planar with the PV Modules).

#### Notes:

1. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4 (i.e. Performance Requirements) specified earlier.
2. If surface pumps are used in lieu of submersible pumps, the water output must match that of the submersible pumps as specified in this table.

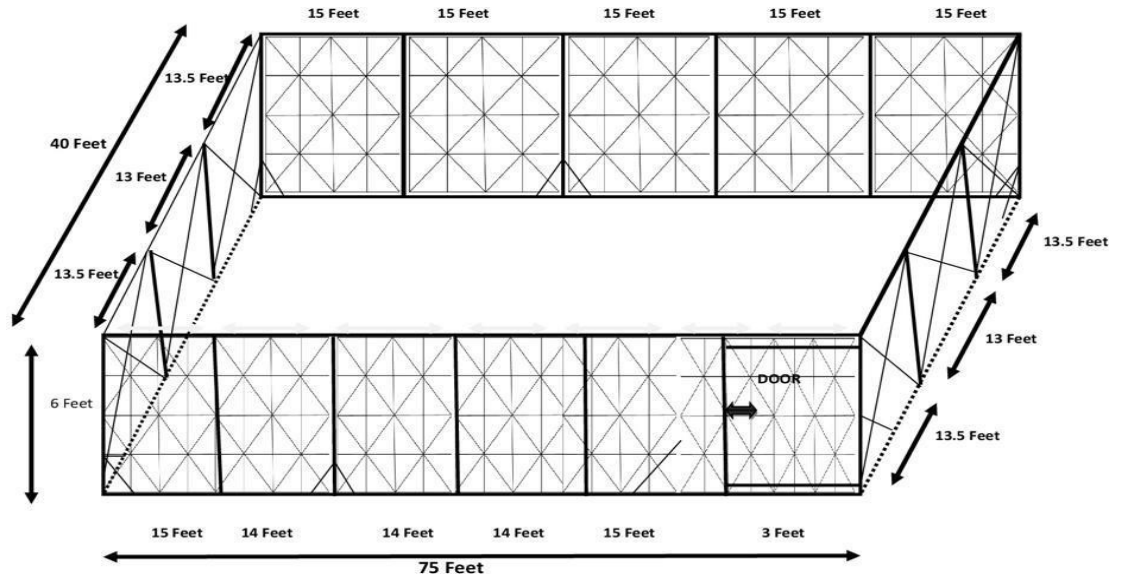
## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

### ❖ Tentative technical information for wire mesh fencing

Capacity of Solar PV Water Pumping Systems (HP)	Approx. Area Reqd. for installation of pump (SQFT)	Approx. Periphery/ Circumference (Ft.)	No. of MS angle	G.I Wire Mesh (Sq.ft)
10	3000	230	29	1380

- **Dimensions of Angle: Height- 09 feet (3 feet beneath the ground (RCC) + 6 feet above the ground).**
  - **Size of M.S ANGLE 50mm X 50mm X 5mm thickness.**
  - **Details M.S Angle Gate: Size 3ft width x 6ft height with 3 no. horizontal angles of 3 ft. and 2 no. horizontal angles of 6 ft. and wire mesh of size 3ft x 6 ft.**
- Diameter of the G.I. wire mesh diameter 3 mm.
- Mesh wire diameter.3 mm. Size 2.5 X 2.5inches.
- Mesh height. 6ft.
- Length of angle.9ft.
- 3ft under the soil.
- Size of angle.50 X 50 X 5 mm.
- Door size 3 ft X 6 ft
- Saw-teeth railing on top of total fencing is compulsory.
- Epoxy painting for fencing is compulsory
- Cantilever support for the angles to bear the maximum load to be given

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## MAHARASHTRA ENERGY DEVELOPMENT AGENCY, PUNE

### ❖ Marking of Project Details:

Every Solar Water Pumping System shall be marked/engraved in such a way that it shall be clearly visible. The details in the marking shall be as given below:

प्रकल्पाचे नाव	
निधीचा स्रोत व अंमलबजावणीचे वर्ष	
कार्यादेश क्र.	
प्रकल्प आस्थापित व कार्यान्वित करण्यात आलेले ठिकाण	
सौर कृषिपंपाची क्षमता (अश्वशक्ती)	
पुरवठादाराचे नाव, संपर्कासाठी पत्ता, व दूरध्वनी क्रमांक	
योजनेची कार्यान्वयन यंत्रणा	महाराज्या, विभागीय कार्यालय, पुणे

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